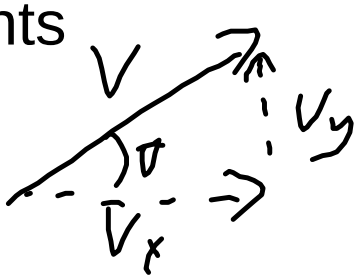
Term 1 test next class - omit it if it lowers your mark
What topics did we study?

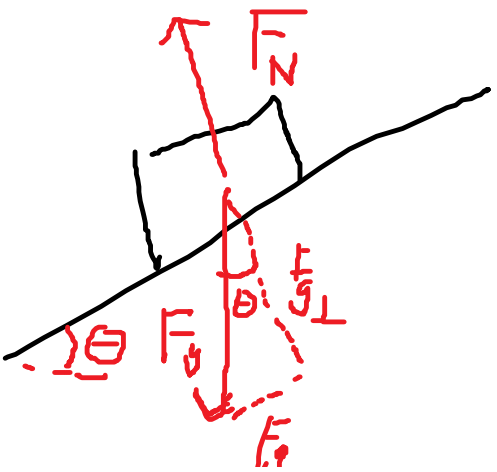
Vectors
add vectors you draw them head to tail
subtract - flip the direction of the second vector
cosine law, sine law
components



$V_x=V\cos\theta$ $V_y=V\sin\theta$
perpendicular vectors are independent
eg. rivers or airplanes or projectiles
projectiles: assume air resistance is negligible
★ V_x is constant $d_x=v_xt$
$a_y=9.8m/s^2$ $d_y=v_yt+\frac{1}{2}gt^2$ $v_{yf}=gt+v_{yi}$ $v_{yf}^2=v_{yi}^2+2gd_y$

Dynamics
Newton's Laws
$F_{net}=ma=\sum F$
$F_{AB}=-F_{BA}$

slopes:



Frictionless
$F_{net}=F_{g||}=mg\sin\theta$
$F_N=F_{gT}=mg\cos\theta$ (not for banking because there is a component of a T to the slope)
Friction
$F_f=\mu F_N=\mu mg\cos\theta$ always opposite v for kinetic friction

pulleys
- look at the whole system, tension cancels out
- to find the tension, look at part of the system

Circular motion
$a=v^2/r=4\pi^2r/T^2$ towards the centre of the circle

Gravity
$F_g=mg=GMm/r^2$

orbits $F_g=F_c=ma$

Q2

$F_{net}=ma=$
$=m4\pi^2rf^2$

a) $F_T=F_{net}$
$F_T=m4\pi^2rf^2$

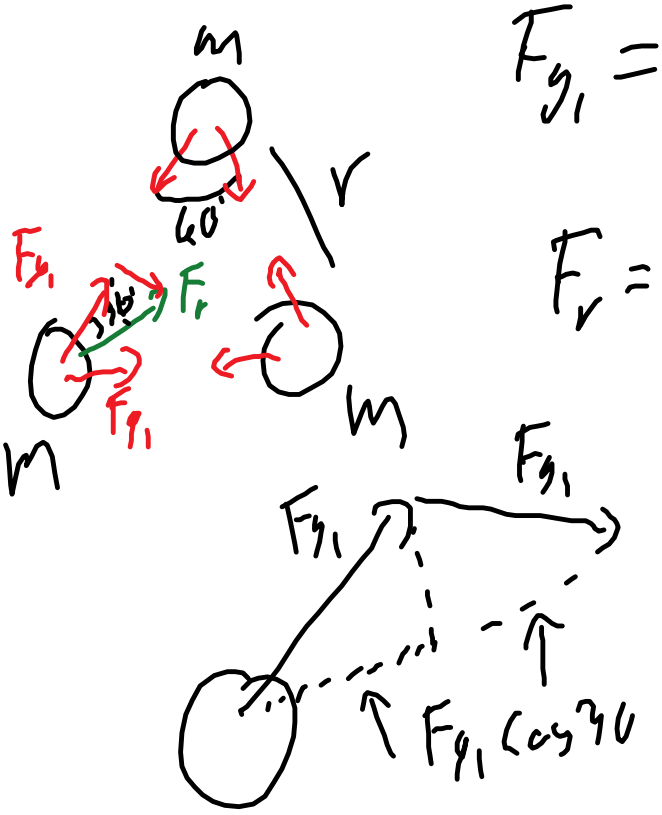
r_2, $F_{T_2} = m_2 4\pi^2 r_2 f^2$

b) $F_{net} = ma = F_{T_1} - F_{T_2}$

$F_{T_1} = F_{T_2} + m_1 4\pi^2 r_1 f^2$

Q13 p121

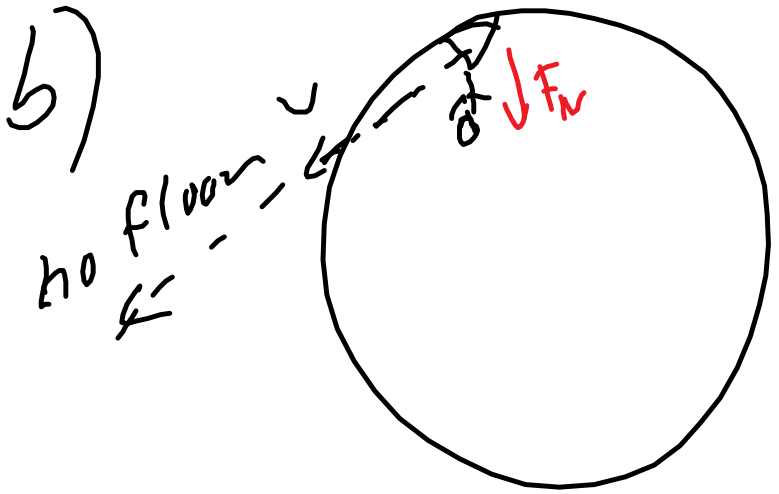
Q3



$F_{g_1} = \frac{GMm}{r^2} = \frac{Gm^2}{r^2}$

$F_r = 2F_{g_1}\cos 30°$

4 a) $g_0 \times g = \frac{4\pi^2 r}{T^2}$



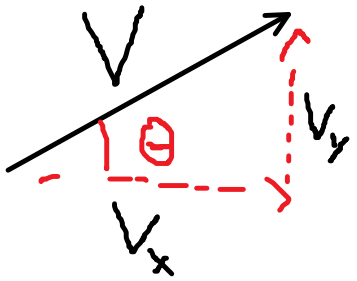
- you have a tangental velocity, so your inertia would have you go in a straight line.
- The floor responds to your motion and provides a normal force towards the centre of the circle.
- the normal force provides the centripetal force
- you feel the force of the floor as being like it would be under gravity.

Review for the test Chapters 1-5
Chapter 6 p143 Q1-4 p144 problems 1-13odds

Term 1 test next class - omit if it doesn't bring your test mark up

Term 1 topics:

Vectors
add vectors head to tail, subtract flip second vector
cosine, sine laws
components

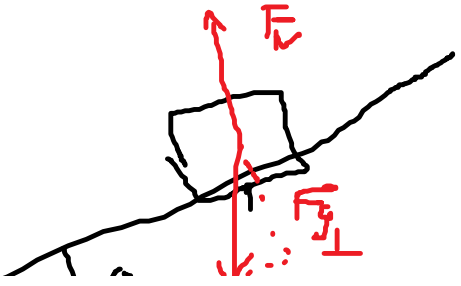


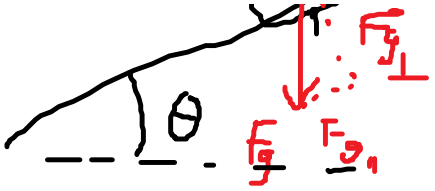
$V_x=V\cos\theta$ $V_y=V\sin\theta$
perpendicular vectors are independent
eg projectiles, river or airplanes in wind\

projectiles: assume air resistance is negligible
v_x constant so $d_x=v_xt$
a_y is 9.80m/s^2 $d_y=v_yt+\frac{1}{2}at^2$ $v_{yf}=v_{yi}+gt$
$v_{yf}^2=v_{yi}^2+2gd_y$

Dynamics
Newton's Laws
$F_{net}=ma=\sum F$ vector sum of all forces
$F_{AB}=-F_{BA}$

slopes





$F_{g\parallel}=mg\sin\theta$
$F_{g\perp}=mg\cos\theta$

$F_N=mg\cos\theta$ if there is no a or other F perpendicular to the surface (not for banking)

$F_f=\mu F_N$

pulley problems

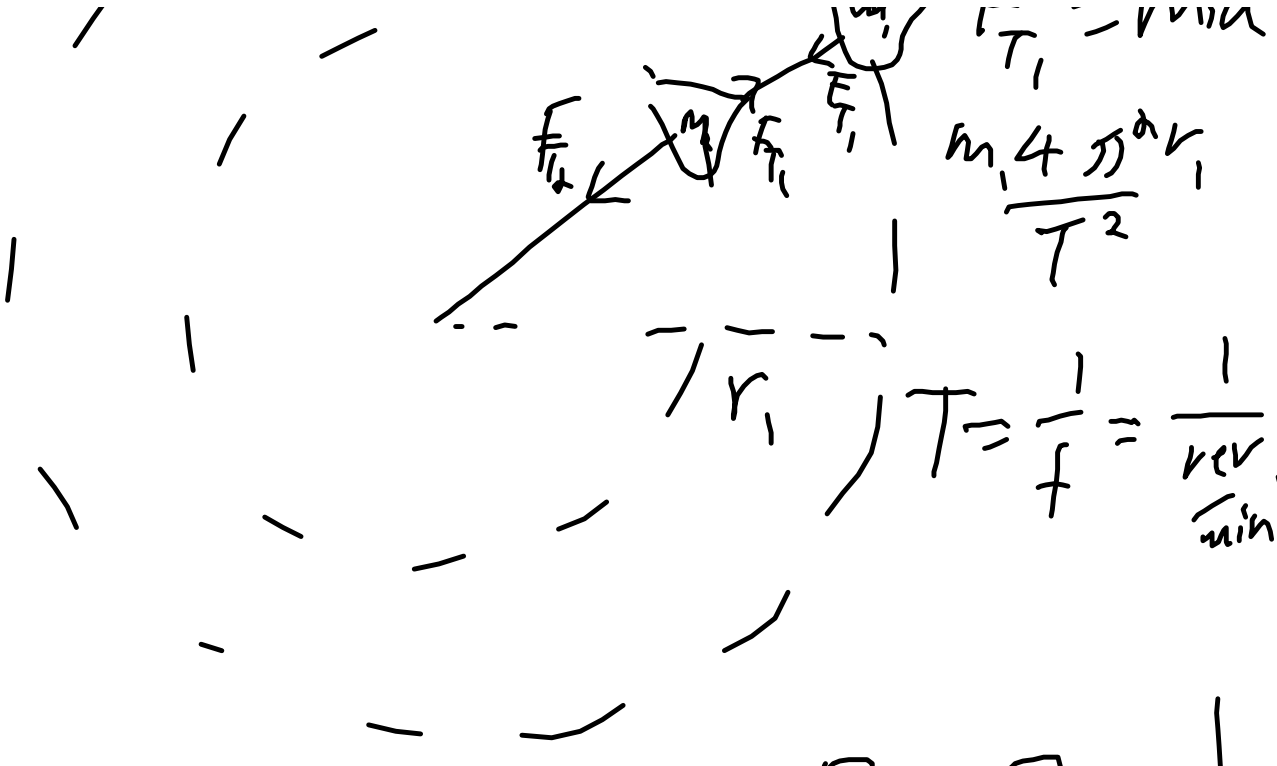
Circular motion
$a=v^2/r = 4\pi^2 r/T^2$

banking $\tan\theta=v^2/rg$

gravity
$F_g=mg=GMm/r^2$

orbits $F_g=ma_c$

p122 Q13

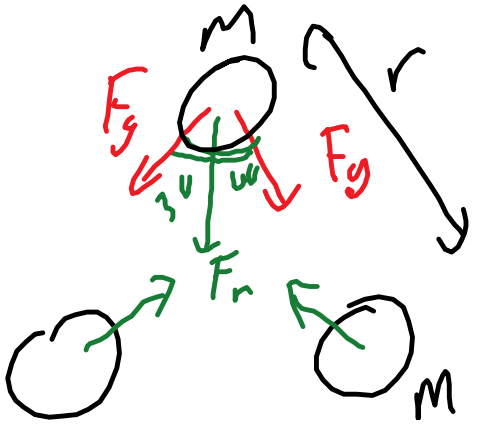


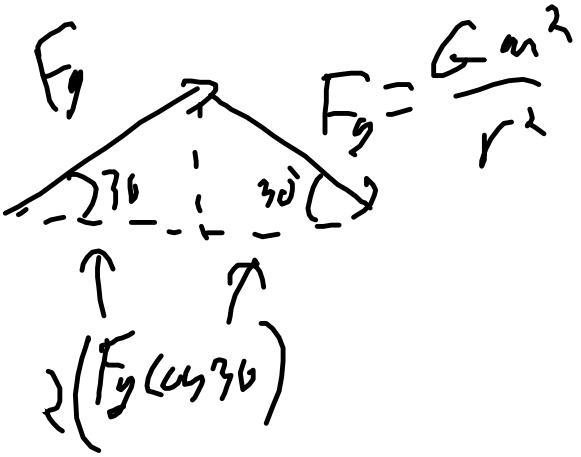
b) $F_{net} = m_2 a = F_{T_2} - F_{T_1}$

$F_{T_2} = m_2 a + F_{T_1}$

$F_{T_2} = m_2 \frac{4\pi^2 r_2}{T^2} +$

Q3





Q4 a) $g = \frac{4\pi^2 L}{T^2}$

b)